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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,630	02/19/2002	Chia-Chi Chung	8409.0004-00	2599

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EXAMINER

LEE, CALVIN

ART UNIT PAPER NUMBER

2825

DATE MAILED: 04/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/076,630

Applicant(s)

CHUNG ET AL.

Examiner

Lee Calvin

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☐ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## OFFICE ACTION

### *Claim Rejections - 35 U.S.C. § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4, 6-9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Wu* (US 6,511,916) in view of *Tu et al.* (US 6,147,005).

*Wu* discloses a method for improving alignment in dual damascene, comprising the steps:

- defining and patterning a first photoresist **440** formed over an insulating layer **410-430**
- etching the insulating material to form a groove **460** [Fig. 4B and col. 4, ln. 31]
- removing the first photoresist [Fig. 4C and col. 4, ln. 31]
- defining and patterning a second photoresist **470** formed over the insulating layer [col. 4, ln. 50]
- depositing a polymer layer over the tops and sidewalls of the second photoresist [col. 4, ln. 61]
- etching the insulating layer to form an opening that is aligned with the groove
- filling the opening with metal to form/finish a via [col. 1, ln. 34]

a) *Wu* suggests dry etching but not anisotropically etching the insulating layer. *Tu et al.* discloses anisotropically etching an insulating layer **4** to create an opening **27** [Fig. 6B and col 5]

It would have been obvious to one having ordinary skill in the art to have modified the etching process of *Wu* by utilizing the claimed etching because such anisotropically etching technique is notoriously well known in the art to remove a semiconductor layer.

b) *Wu* teaches or suggests the polymer but not a layer of carbon-fluoride material. Nevertheless, such carbon-fluorine polymer is known in the semiconductor processing art as evidenced by *Tu et al.* disclosing to deposit a polymer layer **24** over the tops and sidewalls of a photoresist **22** [Fig. 4a], wherein the polymer layer is formed, through a PECVD process at a temperature of about 20°C [col.4, ln. 55].

Moreover, *Tu et al.* disclose that the ratio of carbon to fluorine by using/adjusting according to preferred etching rate and efficient [col. 4, lns. 36-56], although *Tu et al.* does not

suggest explicitly the ratio of carbon to fluorine in the carbon-fluoride material is at least 0.25 (*in re* claims 3 and 8). It would have been obvious to one having ordinary skill to have modified the carbon-fluorine layer formation of *Tu et al.* by utilizing the claimed ratio because one would adjust atoms amount of carbon and/or fluorine to result the claimed carbon-fluorine ratio of 0.25.

3. Claims 5 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Wu* and *Tu et al.*, as applied to claims 1 and 6, in view of *Lin et al.* (US 6,376,366).

The combination of *Wu* and *Tu et al.* does not teach or suggest a defined and patterned photoresist is misaligned with a groove. *Lin et al.* discloses a defined and patterned photoresist 260 is misaligned with a groove 255 formed inside an insulating layer 240 [Fig. 2d and col. 5].

It would have been obvious to one having ordinary skill to have modified the method of *Wu* and *Tu et al.* by utilizing the misaligned process in dual damascene because it simplifies dual damascene process in sub-micron technologies.

#### *Conclusion*

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: *Tsai et al.* (US 6,251,791) discloses depositing a carbon-fluoride polymer layer over the tops and sidewalls of a photoresist overlying an insulating layer, which is etched to form an opening [Fig. 2D and col. 3]; and *Lin* (US 6,297,554) discloses a dual damascene interconnect having a carbon fluorine that covers patterned photoresist [Fig. 5 and cols. 3-4].

5. Any inquiry concerning this communication should be directed to Examiner *Calvin Lee* at (703) 306-5854 during Monday through Thursday between 7:00 to 16:30 (ET). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* can be reached on (703) 308-1323.

Any inquiry relating to the status of this application should be directed to the receptionist at (703) 308-0596. The fax phone number is (703) 305-3431 for regular communications and for After-Final communications.

CL

*C. Lushart*

March 31, 2003